REMARKS

Claims 1 through 16 and new Claims 17 through 19 are pending in the application.

Applicants acknowledge with gratitude that Claim 7 has been allowed. Accordingly, Claim 7 has been amended into independent form.

Claim 1 has been amended to emphasize that advantageously the functional group has free p electrons. Support for this amendment can be found in the Application-as-filed, for example on Page 8, lines 24 through 30.

Claims 17 through 19 have been added to highlight advantageous embodiments of the invention and complete the record for examination.

Claim 17 is directed to advantageous embodiments in which the saturated organic compound containing at least one functional group is more polar and/or less sterically hindered than the one or more organic compounds. Support for Claim 17 can be found in the Application-as-filed, for example on Page 8, lines 24 through 29 and Page 11, lines 16 through 20.

Claim 18 is directed to advantageous embodiments in which the saturated organic compound bearing a functional group is selected from the group consisting of lauric, myristic, palmitic, palmitoleic, stearic, arachic and behenic acids. Support for Claim 18 can be found in the Application-as-filed, for example on Page 6, lines 1 through 3.

Claim 19 is directed to advantageous embodiments in which the ion exchanger has a water content of less than 10 ppm. Support for Claim 19 can be found in the Application-as-filed, for example on Page 10, lines 1 through 3.

Reexamination and reconsideration of this application, withdrawal of all rejections, and formal notification of the allowability of the pending claims are earnestly solicited in light of the remarks which follow.

The Claimed Invention is Patentable
in Light of the Art of Record

Claims 1 through 4 and 9 through 16 stand rejected over WO 200298826 (WO 826), as evidenced by Publication No. 2004/0162437 to Fabritus et al. (US 437)[1]. Claims 5, 6 and 8 stand rejected over US 437 in view of JP 61221298 (JP 298). Claims 1 through 6, 8 through 10, 12 and 16 stand rejected over United States Patent No. 3,922,217 to Cohen et al. (US 217).

It may be useful to consider the invention before addressing the merits of the rejection.

Separating and purifying organic compounds from mixtures of substances is still, in many sectors, a problem which has not been solved satisfactorily. For example, for partial esters of glycerol with higher fatty acids such as monoglycerides, scarcely any simple and effective methods are available for purification.

Surprisingly, Applicants have found that saturated organic compounds having free p electrons bind particularly well to silver-loaded ion exchange resins.

In especially advantageous embodiments, the saturated organic compounds include a functional group containing at least one of =O, -OH, -C(O)OH, -C(O)H, -COOR, -C-O-C- and –C-O-R-, as recited in Claim 2.

[1] Applicants respectfully make of record that US 437 is the corresponding US application to the international application published as WO 829. Consequently, remarks directed to US 437 are intended to distinguish WO 829, as well.

In further advantageous embodiments, the saturated organic compound incorporates a functional group having at least one active hydrogen atom, as recited in Claim 3.

In especially beneficial aspects of the invention, the saturated organic compound containing at least one functional group has greater polarity and/or less steric hindrance than the organic compounds, as recited in Claim 17

The separation of saturated compounds in silver-ion-loaded ion exchangers based on the differential availability of valence electrons within saturated compounds allows for quite sophisticated separations. For example, saturated organic compound containing a monoglyceride functional group can be separated from diglyceride organic compounds. In fact, monoglyceride organic compounds substituted in a first position can be separated from monoglyceride organic compounds substituted at other positions.

The cited references do not teach or suggest the claimed invention.

A. Claims 1 through 4 and 9 through 16 are Patentable in Light of WO 826, and its United States equivalent US 437.

US 437 (and WO 826) is directed to an extraction method to produce unsaturated compounds from mixtures. More particularly, this method is restricted to compounds containing highly unsaturated components, for example unsaturated long-chain fatty acids having 4 or more double bonds. (US 437, [0039]). Considered as a whole, US 437 clearly indicates that more highly unsaturated compounds, i.e. compounds with greater amounts of double bonding, complex more strongly with the ion exchange resin. (US 437, [0039] (noting that compounds with less than 4 double bonds may not require acetonitrile for detachment) and [0040] (noting that hexaunsaturated PUFAs bind more strongly to the exchanger than triunsaturated PUFAs due to the increased number of double bonds)).

In fact, US 437 suggests that its ion exchange resins would not be suitable for complexation with saturated organic compounds. (US 437 [0001] (noting the selective complexation of polyunsaturated fatty acids from mixtures further containing saturated fatty acids, i.e. the saturated fatty acids remain in solution)). In addition to greater double bonding, US 437 indicates that separation selectivity may be effected by a number of factors, including the amount of the unsaturated acid and the type of ion exchanger. (US 437, [0059]).

As correctly noted by the Examiner, US 437 fails to teach or suggest the recited separation of saturated compounds. In fact, the selective separation of saturated compounds is surprising, particularly in light of US 437's teaching that such saturated compounds would instead stay in solution. Applicants further respectfully make of record that the Office Action's assertion as to the composition of the PUFA impurities contradicts the express teachings of US 437.

And US 437 most certainly does not teach or suggest the advantageous separation of saturated compounds incorporating functional groups having free p electrons, as recited in Claim 1 as-amended. US 437 instead clearly teaches that increasing unsaturation is key to selective complexation.

Nor does US 437 teach or suggest saturated organic compound having a functional group which contains at least one group which is selected from =O, -OH, -C(O)OH, -C(O)H, -COOR, -C-O-C- and –C-O-R-, as recited in Claim 2.

US 437 thus likewise fails to teach or suggest advantageous saturated organic compounds having a functional group with at least one active hydrogen atom, as recited in Claim 3.

And US 437 most certainly fails to teach or suggest the recited separation of saturated compounds in which the saturated organic compound is more polar and/or less sterically hindered than the other organic compounds, as recited in Claim 17.

US 437 likewise fails to teach or suggest the advantageous compounds of Claim18, in which the saturated organic compound bearing a functional group is selected from the group consisting of lauric, myristic, palmitic, palmitoleic, stearic, arachic and behenic acids.

Accordingly, Applicants respectfully submit that Claims 1 through 4 and 9 through 19 are Patentable in Light of US 437 (and WO 826), considered either alone or in combination with the remaining art of record.

B. Claims 5, 6 and 8 are likewise patentable over US 437 in view of JP 298.

JP 298 merely broadly discloses that conventional ion exchange resins may be used in conjunction with monoglycerides. In contrast to the opinion urged within the Office Action, JP 298 does not describe the monoglyceride with any great particularity, other than a general reference to beta-monolinolein. Applicants respectfully submit that linolein, a glyceride of linoleic acid, includes 3 double bonds.

Accordingly, in contrast to the opinion urged within the Office Action, JP 298 likewise fails to teach or suggest the recited separation of saturated compounds. JP 298 instead similarly teaches the separation of unsaturated compounds.

And JP 298 most certainly does not teach or suggest the advantageous separation of saturated compounds incorporating functional groups having free p electrons, as recited in Claim 1 as-amended.

Nor does JP 298 teach or suggest such saturated organic compound bearing a functional group is selected from the group consisting of: alcohols having from 12 to 30 carbon atoms, esters of hydroxycarboxylic acids and/or aminocarboxylic acids and esters or ethers of polyhydric

alcohols, as recited in Claim 5. JP 298 instead merely makes generic reference to monoglycerides as a whole, and a triple unsaturated glyceride in particular.

JP 298 thus can not teach or suggest such saturated organic compound bearing a functional group is selected from the group consisting of: esters or ethers of ethylene glycol, propylene glycol, propanediol, 1,2- or 1,3-butanediol and glycerol, as recited in Claim 6.

JP 298 likewise fails to teach or suggest such saturated organic compounds having a functional group is selected from the group consisting of mono- and disubstituted glycerol, the substituents being identical or different fatty acids, as recited in Claim 8.

There would have been no motivation to have combined US 437 and JP 298. Applicants respectfully submit that merely because the references can be combined is not enough, there must still be a suggestion. MPEP 2143.01 (section citing *Mills*).

However, even if combined (which Applicants did not do), the claimed invention would not result.

In particular, the combination clearly fails to teach or suggest the recited separation of saturated compounds. Both US 437 and JP 298 instead teach the separation of unsaturated compounds.

And the combination most certainly fails to teach or suggest the advantageous separation of saturated compounds incorporating functional groups having free p electrons, as recited in Claim 1 as-amended.

Nor does the combination teach or suggest the separation of such saturated organic compound bearing a functional group is selected from the group consisting of: alcohols having

from 12 to 30 carbon atoms, esters of hydroxycarboxylic acids and/or aminocarboxylic acids and esters or ethers of polyhydric alcohols, as recited in Claim 5.

The combination thus can not teach or suggest the separation of such saturated organic compound bearing a functional group is selected from the group consisting of: esters or ethers of ethylene glycol, propylene glycol, propanediol, 1,2- or 1,3-butanediol and glycerol, as recited in Claim 6.

The combination likewise fails to teach or suggest the separation of such saturated organic compounds having a functional group is selected from the group consisting of mono- and disubstituted glycerol, the substituents being identical or different fatty acids, as recited in Claim 8.

The combination similarly fails to teach or suggest the highly advantageous separations of Claims 17 through 19.

Accordingly, Applicants respectfully submit that Claims 5, 6, 8 and 17 through 19 are patentable in light of US 437 and JP 298, considered either alone or in combination.

C. *Claims 1 through 6, 8 through 10, 12 and 16 through 19 are likewise patentable in light of US 217*

US 217 is generically directed to the removal of "polar compounds" using ion exchange resins containing up to 30 wt % water. (Col. 1, lines 52 – 56). Suitable "polar compounds" are any of a generic list of small molecules. (Col. 4, lines 20 – 25). The working examples disclose dimethylformamide. (Col. 5, lines 25 – 62). US 217 likewise provides an extensive laundry list of suitable ion exchange resins, including anionic resins. (Col. 2, lines 1 – 48).

Accordingly, Applicants respectfully submit that US 217's generic disclosure fails to teach or suggest the recited separation of saturated compounds, particularly saturated compounds incorporating functional groups having free p electrons, within a silver-ion-loaded ion exchanger as recited in Claim 1 as-amended. Applicants further respectfully submit that US 217's generic disclosure does not provide sufficient guidance, particularity or reasonable expectation of success for one skilled in the art to have arrived at the claimed invention.

Nor does US 217's generic disclosure teach or suggest such saturated organic compounds having a functional group which contains at least one group which is selected from =O, -OH, -C(O)OH, -C(O)H, -COOR, -C-O-C- and –C-O-R-, as recited in Claim 2.

US 217 thus likewise fails to teach or suggest advantageous saturated organic compounds having a functional group with at least one active hydrogen atom, as recited in Claim 3.

And US 217 most certainly fails to teach or suggest the recited separation of saturated compounds in which the saturated organic compound is less sterically hindered than the other organic compounds within a silver-ion-loaded ion exchanger, as recited in Claim 17.

US 217, directed to the separation of small molecules, likewise fails to teach or suggest the advantageous compounds of Claim18, in which the saturated organic compound bearing a functional group is selected from the group consisting of lauric, myristic, palmitic, palmitoleic, stearic, arachic and behenic acids.

And US 217 can not teach or suggest the beneficial methods of Claim 19, in which the ion exchanger has a water content of less than 10 ppm. In fact, to modify US 217 so as to avoid its required elevated amounts of water within the ion exchange resin would render it unfit for its intended purpose. MPEP 2143.01 (citing In re Gordon, 221 USPQ 1125 (Fed. Cir. 1984)).

Accordingly, Applicants respectfully submit that Claims 1 through 6, 8 through 10, 12 and 16 through 19 are patentable in light of US 217, considered either alone or in combination with the remaining art of record.

CONCLUSION

It is respectfully submitted that Applicants have made a significant and important contribution to the art, which is neither disclosed nor suggested in the art. It is believed that all of pending Claims 1 through 19 are now in condition for immediate allowance. It is requested that the Examiner telephone the undersigned if any questions remain to expedite examination of this application.

It is not believed that extensions of time or fees are required, beyond those which may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time and/or fees are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required is hereby authorized to be charged to Deposit Account No. 50-2193.

Respectfully submitted,

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M3 - [01] H4 H402 H482 H721 H8 J0 J011 J2 J271 M220 M221 M222 M223 M224 M225 M226 M231 M232 M233 M262 M281 M313 M321 M332 M343 M383 M391 M416 M620 M720 M903 N163 Q271
PA - (AJIN) AJINOMOTO KK
PN - JP61166399 A 19860728 DW198636 004pp
PR - JP19850005445 19850116
XA - C1986-101728
XIC - C11B-003/10 ; C12P-007/64
AB - J61166399 Method comprises (a) contacting the soln. contg. monoglyceride with non-polar synthetic adsorbent resin for adsorbing monoglyceride selectively on it, and (b) eluting mono-glyceride with organic solvent.
- Pref. non-polar synthetic adsorbent resin is Amberlite XAD series, Dialon HP series, Imactl syn. resin, etc. and eluting soln. is aq. 50% ethanol soln. The sepn. of monoglyceride can be improved by increasing the proportion of either. Method does not include heat-treating process and can be applied favourably for concentrating beta-monolinolein stably without rearrangement caused from heat-treatment.
- USE/ADVANTAGE - Non-polar synthetic adsorbent resin can be easily regenerated and monoglyceride can be eluted from it with non-toxic organic solvent e.g. aq. ethanol soln. Monoglyceride can be selectively sepd. from the mixt. obtd. by hydrolysing natural oil and fat enzymically and contains free fatty acids, diglycoride, triglyceride, etc. other than monoglyceride. (4pp Dwg.No.0/0)
IW - MONO GLYCERIDE REFINE METHOD COMPRISE CONTACT NON POLE SYNTHETIC ADSORB RESIN ELUTION ORGANIC SOLVENT
IKW - MONO GLYCERIDE REFINE METHOD COMPRISE CONTACT NON POLE SYNTHETIC ADSORB RESIN ELUTION ORGANIC SOLVENT
NC - 001
OPD - 1985-01-16
ORD - 1986-07-28
PAW - (AJIN) AJINOMOTO KK
TI - Mono:glyceride refining method - comprises contacting with non-polar synthetic adsorbent resin and eluting with organic solvent